

3.0 SITE SPECIFIC RISK-BASED END STATE DESCRIPTION

3.1 Physical and Surface Interface

The 35,000-acre Oak Ridge Reservation contains three major DOE facilities - ETP, ORNL, and the Y-12 National Security Complex. These installations occupy approximately 30 percent of the ORR, with the remainder being largely undeveloped. All of the ORR lies within Anderson and Roane Counties, and most of the property is within the corporate city limits of Oak Ridge.

The Clinch River forms the southern (Melton Hill Reservoir) and western boundaries of the ORR. All water that drains from the ORR enters the Clinch River and subsequently the Tennessee River.

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As noted previously, the ORR lies within the western portion of the Valley and Ridge Province, in the Southern Appalachian Region. The topography is marked by long linear ridges and intervening valleys. Streams and tributaries within the ORR are numerous. Most of the northern and central portions of the ORR lie within the watershed of East Fork Poplar Creek and its tributary, Bear Creek. The southern portion of the ORR either lies within the White Oak Creek watershed or drains via short tributaries directly to the Clinch River. Stream flow in tributaries across the ORR varies greatly depending on seasonal precipitation and subsurface geology.

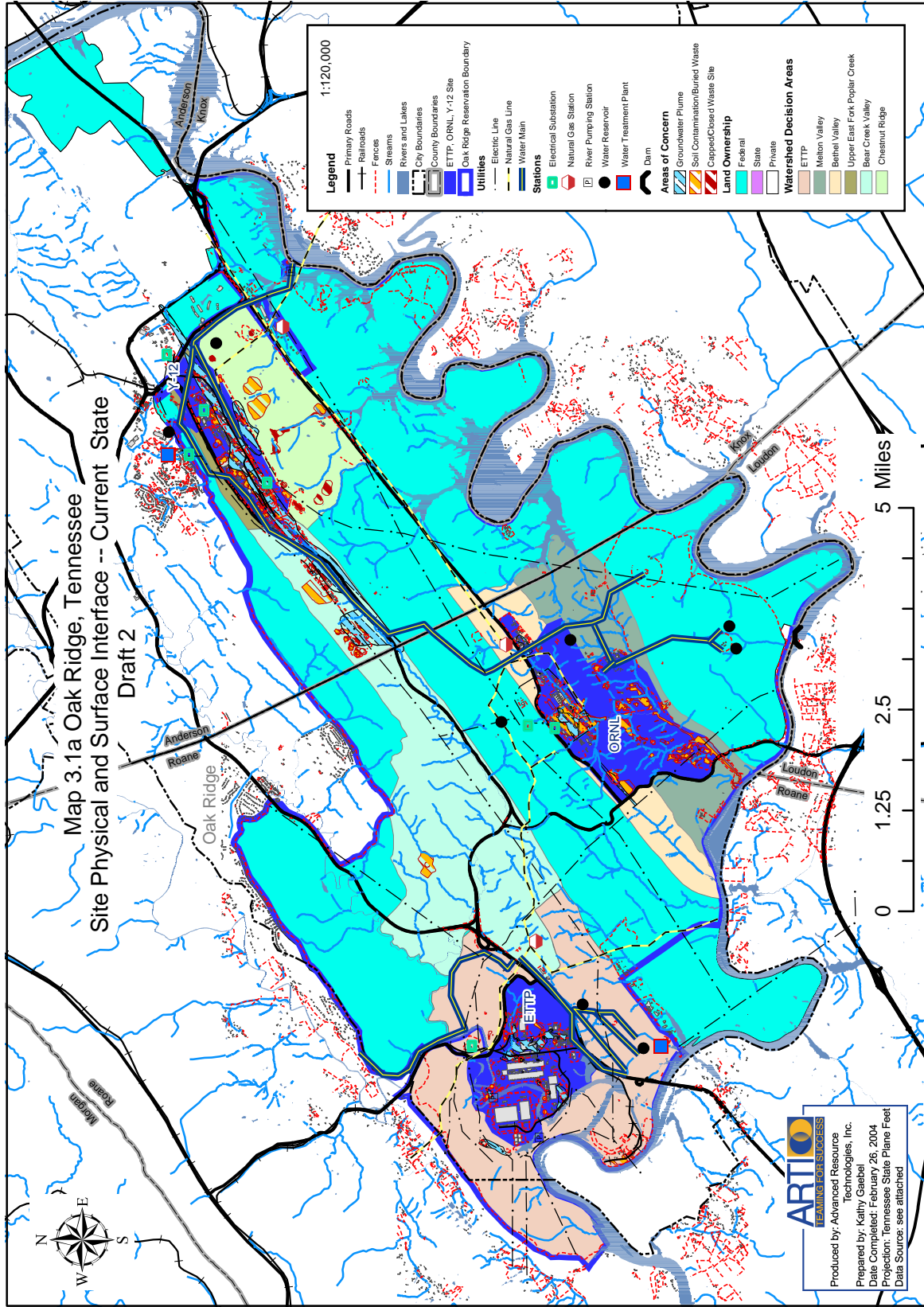
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Most of the groundwater underlying the ORR occurs in the overburden and the fractured rock formations, which provide preferential flow pathways usually along “open” fractures in the rock. The predominant groundwater flow directions are parallel to geological bedding and the orientation of the ridges and valleys. Most groundwater flow is shallow, less than 100 feet deep. In general, groundwater movement is minimal below 100 feet in the shale formations because of the lack of “open” fractures in these formations below that depth. Groundwater movement occurs to greater depths in the carbonate formations where fractures have been widened by dissolution of the carbonate rock. Most groundwater discharges to local streams that ultimately flow into the Clinch River, a major tributary to the Tennessee River.

Major roadways in the immediate vicinity of the ORR include the interstate highways discussed previously, I-40 immediately to the south and I-75 to the south and to the east, as well as three state highways that provide access to the ORR for employees and transient traffic. SR-95 forms an interchange with I-40, enters the ORR from the south, and continues northwest and then northeast through the city of Oak Ridge. SR-58 intersects with SR-95 as it enters the ORR from the west. SR-162, the Pellissippi Parkway, is a major link between Knoxville and Oak Ridge to the east of the ORR. Additional major roads within the ORR include Bear Creek Road, Bethel Valley Road, and Blair Road. An extensive network of other paved and unpaved roadways exists within the ORR.

Two main-line rail branches serve the ORR, one at Y-12 and the other at ETP. An inactive barge terminal is located on the Clinch River at ETP.

Figures 3.1a and 3.1b depict the physical and surface interface features of the ORR for the current state and RBES conditions, respectively. No differences between current and RBES



Map 3.1b Oak Ridge, Tennessee
Site Physical and Surface Interface -- RBES
Draft 2

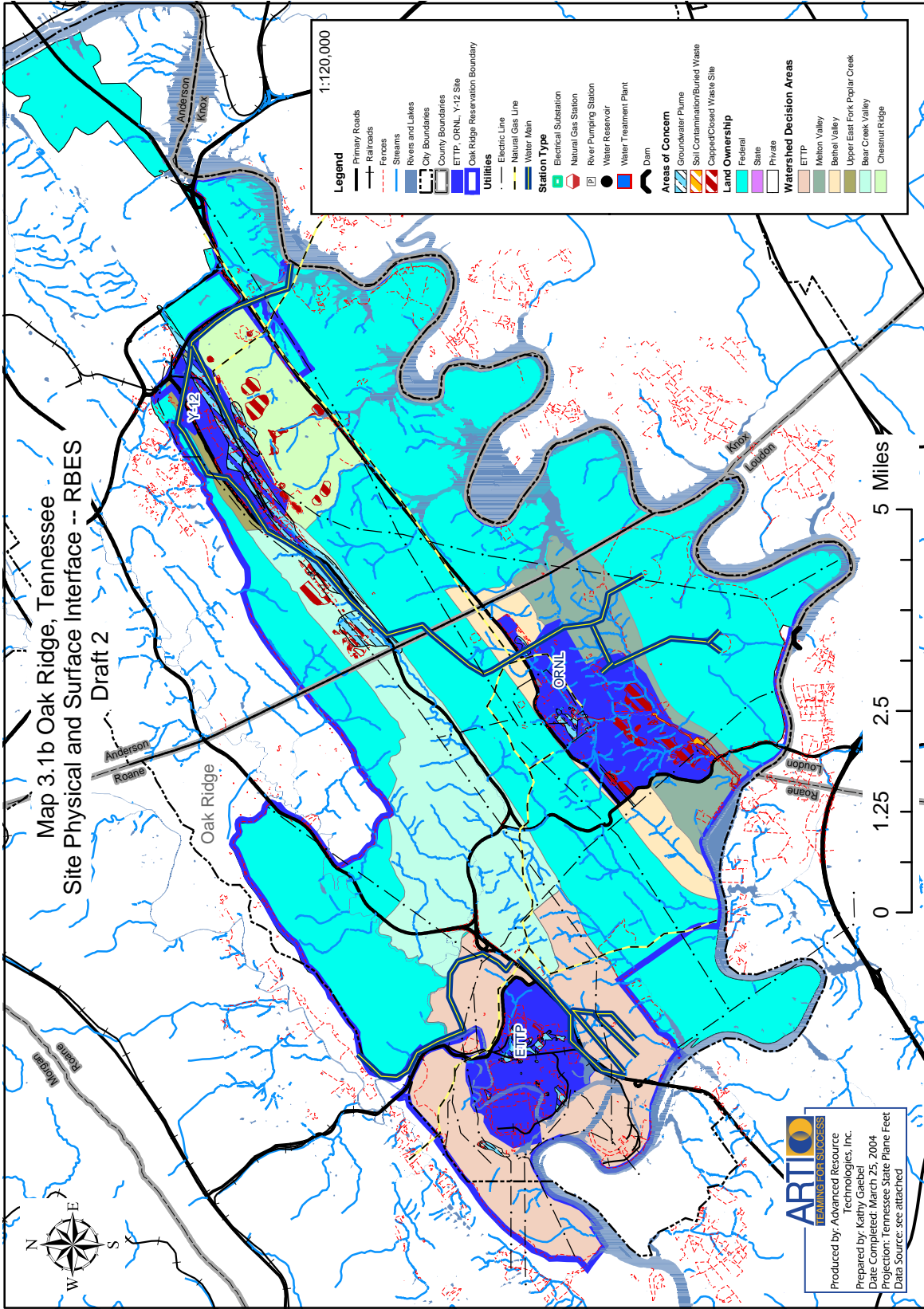
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Legend

- Primary Roads
- Railroads
- Fences
- Streams
- Rivers and Lakes
- City Boundaries
- County Boundaries
- ETTP, ORNL, Y-12 Site
- Oak Ridge Reservation Boundary
- Utilities**
 - Electric Line
 - Natural Gas Line
 - Water Main
- Station Type**
 - Electrical Substation
 - Natural Gas Station
 - River Pumping Station
 - Water Reservoir
 - Water Treatment Plant
- Areas of Concern**
 - Groundwater Plume
 - Soil Contamination/Buried Waste
 - Capped/Closed Waste Site
- Land Ownership**
 - Federal
 - State
 - Private
- Watershed Decision Areas**
 - ETTP
 - Melton Valley
 - Bethel Valley
 - Upper East Fork Poplar Creek
 - Bear Creek Valley
 - Chestnut Ridge

0 1.25 2.5 5 Miles

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conditions outside the ORR have been identified.

3.2 Human and Ecological Land Use

The ETPP, ORNL and Y-12 sites occupy approximately 30 percent of the ORR. As noted previously, the ORNL and Y-12 facilities continue to operate as major industrial facilities, with current and ongoing DOE missions of research and development and defense-related manufacturing and stockpile stewardship, respectively. Current activity at ETPP is primarily directed toward environmental remediation, with some commercial industrial use. Future land use at ORNL and Y-12 is expected to continue as DOE/NNSA-controlled industrial use (with some areas dedicated to waste disposal), while ETPP is expected to be developed as a commercial industrial park.

Needs for facility and infrastructure improvements at ORNL are described in the *ORNL Land and Facilities Plan* (UT-Battelle 2002). Similar considerations for the Y-12 site are described in the *Y-12 National Security Complex Ten-Year Comprehensive Site Plan* (BWXT 2003); and a longer-range (30-year) *Master Site Plan* is currently under development. Overall DOE-ORO land use planning under the *ORR Comprehensive Integrated Plan* has determined that most of the ORR, with the exception of the ETPP site and the adjacent areas addressed by the Oak Ridge Land Use Planning Focus Group study (ORLUPFG 2002), will be required for current and future DOE mission needs.

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Except for the city of Oak Ridge, the area immediately surrounding the ORR is predominantly rural, including woodlands, small farms and residences. Commercial forestry is the leading land use in the five-county area, followed by agricultural, residential, and recreational uses. The city of Oak Ridge has residential areas primarily along the northern and eastern boundaries of the ORR, including four residential areas along the northern boundary that have several houses within approximately 100 ft of the ORR boundary. A few Roane County residents have homes adjacent to the western boundary. The Clinch River, which bounds the ORR to the south and southeast, forms a boundary between Knox County, Loudon County, and portions of Roane County.

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Approximately 2 percent of the ORR is currently open to public use, including the Clark Center Recreation Park, visitor centers, the ORNL Graphite Reactor (National Historical Landmark), cemeteries, roadways, and greenways. Limited hunting is allowed under the auspices of the Tennessee Wildlife Resources Agency to control the deer and turkey populations. As noted previously, the entire ETPP site is expected to be made available for commercial industrial use.

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Remote sensing data from 1994 showed 70 percent of the ORR in forest cover while 20 percent was transitional, consisting of old fields, agricultural areas, cutover forest lands, roadsides, and utility corridors. Less than 2 percent of the ORR remains as open agricultural fields. Currently, 580 acres of wetlands on the ORR provide water quality benefits, stormwater control, wildlife habitat, and landscape and biological diversity. About 3500 acres are used as waste sites or remediation areas. (LMER 1999)

The Oak Ridge National Environmental Research Park (NERP) and the Oak Ridge Wildlife Management Area lie within the boundary of the ORR. The ORNERP was established in 1980,

as one of seven DOE parks established throughout the United States to provide protected land for environmental science research and education. The ORNERP is an ORNL user facility which serves as an outdoor laboratory for the study of present and future impacts of energy-related technologies on the environment. The ORNERP was designated as a component of the Southern Appalachian Biosphere Reserve in 1988.

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The Oak Ridge Wildlife Management Area was established through a cooperative agreement between DOE and the TWRA in 1984. Most of the ORR is designated a Tennessee Wildlife Management Area through this cooperative agreement, to provide protection of wildlife habitat and species. Wildlife management is carried out under these agreements by TWRA in cooperation with ORNL's Environmental Sciences Division.

In 1999, the Secretary of Energy set aside 3000 acres of ORR as a conservation and wildlife management area in an agreement between DOE and TWRA. The proclamation calls for the land to be cooperatively managed for preservation purposes under a use permit. This area, called the Three Bend Scenic and Wildlife Management Refuge Area, is located in the ORR buffer zone on Freels, Gallaher, and Solway bends on the north shore of Melton Hill Reservoir in Anderson County. TWRA, in consultation with DOE, will prepare a cooperative agreement to serve as a natural resources management plan that establishes guidelines for managing this area with the intent to preserve and enhance its natural attributes.

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Another 3000-acre tract on Black Oak Ridge and McKinney Ridge near the ETTP site also has been committed under a conservation easement.

Forty-five Federal- or state-listed threatened, endangered, and other special status species have been identified on the ORR. No Federally listed threatened or endangered plant species and only two Federal-listed animal species have been identified on the ORR: the bald eagle (*Haliaeetus leucocephalus*) and the gray bat (*Myotis grisescens*). No critical habitat for threatened or endangered species, as defined in the Endangered Species Act (50 CFR 17.11 and 17.12), exists on the ORR. The ORR also has four plant and two animal species designated as Federal species of concern: Appalachian bugbane (*Cimicifuga rubifolia*), butternut (*Juglans cinerea*), spreading false foxglove (*Aureolaria patula*), tall larkspur (*Delphinium exaltatum*), paddlefish (*Polyodon spathula*), and loggerhead shrike (*Lanius ludovicianus*). State threatened and endangered species observed on the ORR include 11 plant, 1 mammal, and 3 raptor species. A population of the Tennessee dace (*Phoxinus tennesseensis*) is found in Bear Creek; this species is classified as "deemed in need of management" by the State of Tennessee. (DOE 2001a)

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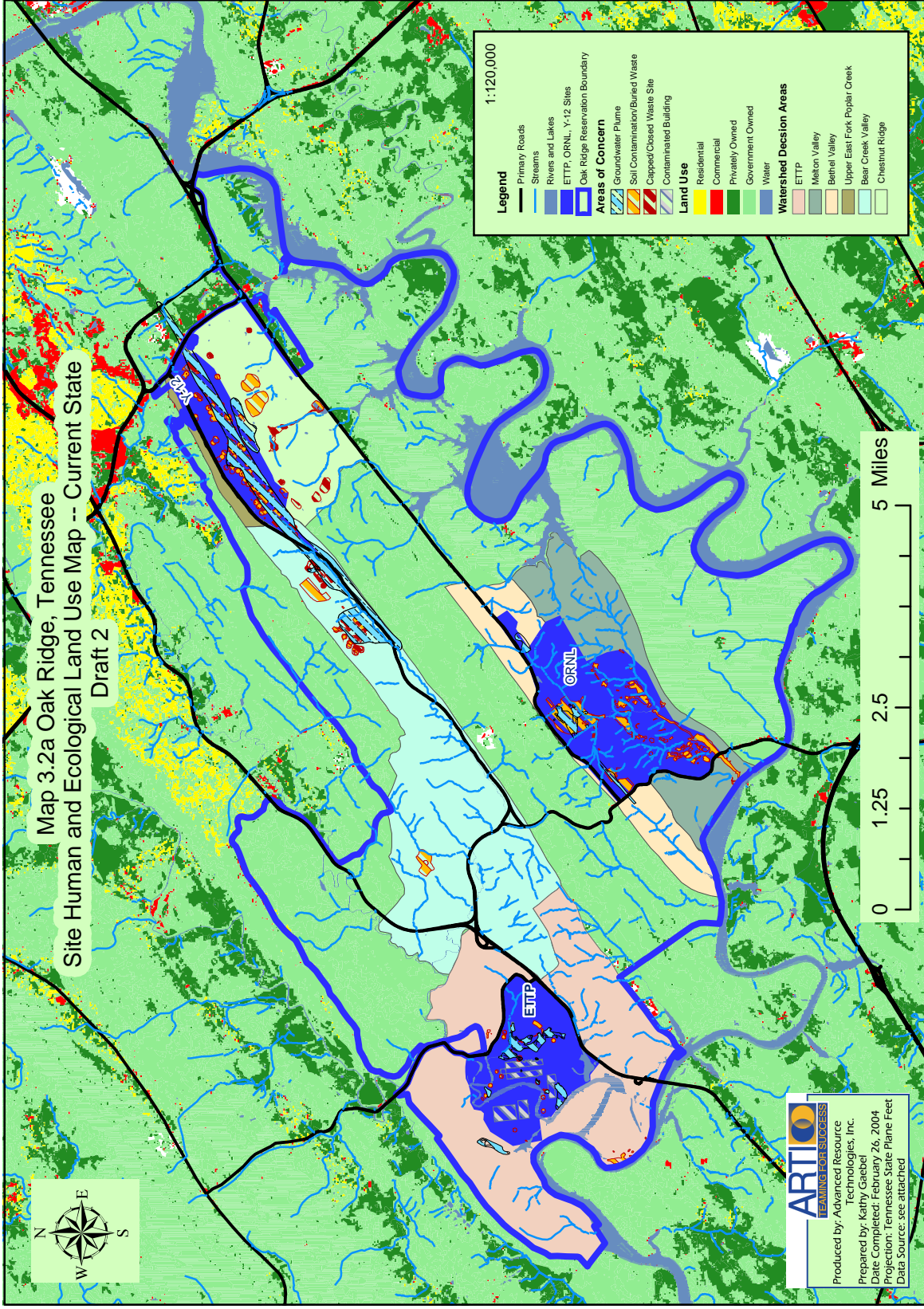
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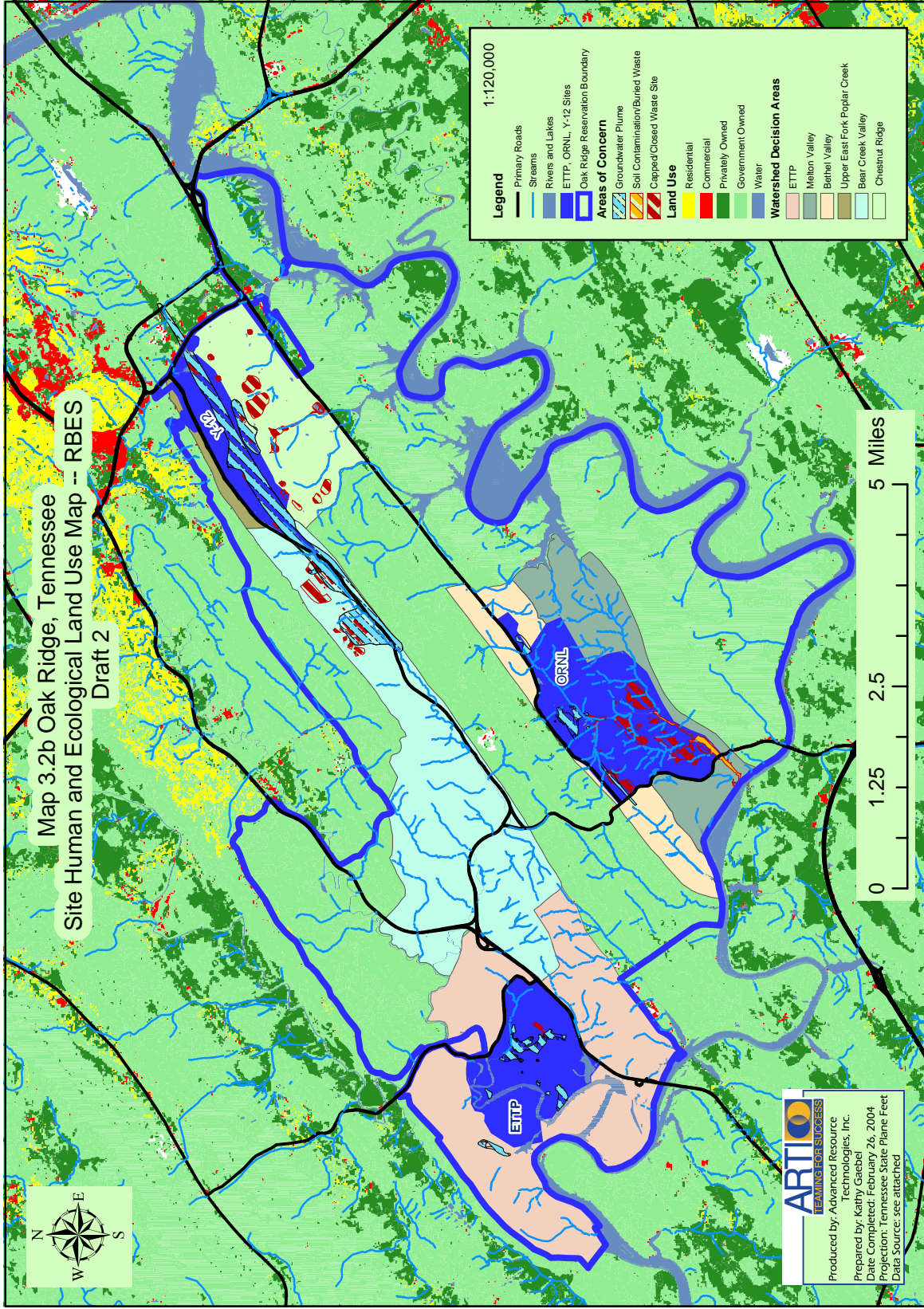
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Figures 3.2a and 3.2b depict the human and ecological land use at the ORR for the current state and RBES conditions, respectively. No differences between current and RBES conditions outside the ORR have been identified.

Map 3.2a Oak Ridge, Tennessee
Site Human and Ecological Land Use Map -- Current State
Draft 2



Map 3.2b Oak Ridge, Tennessee
 Site Human and Ecological Land Use Map -- RBES
 Draft 2



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3.3 Site Context Legal Ownership

The Oak Ridge Reservation currently occupies 34,513 acres, mostly within the corporate limits of the City of Oak Ridge. All of this land is titled to the United States of America, and under the jurisdictional control of DOE for administration and management.

The United States Federal Government originally acquired 58,575 acres of land for the ORR between 1942 and 1947. Since that time, ownership of approximately 24,062 acres has been transferred to others. About 25 percent of this total has been transferred to the city of Oak Ridge for development, including: 270 acres for schools; 1083 acres for utilities, drainage, and roads and streets; 1475 acres for municipal properties; and 29 acres for public housing. Of the remaining land tracts: approximately 2315 acres were conveyed to the State of Tennessee for health, forestry, agricultural research, and a biomedical graduate school; 12,686 acres to private ownership; 2992 acres to the Tennessee Valley Authority; 28 acres to Anderson County; 9 acres to the town of Oliver Springs; and 63 acres to other Federal agencies. (DOE 2001)

Deleted: Land conveyed for private entities and homeowners totals 12692 acres.

As a result of a decision by the Secretary of Energy in 1979 allowing DOE to make financial assistance payments to the city of Oak Ridge for a 5-year period under the Atomic Energy Community Act of 1955, the city submitted a self-sufficiency plan which proposed that DOE sell land to the city for industrial/commercial development. This plan allowed direct transfer of excess land to the city at fair market price rather than turning it over to the General Services Administration for disposal. The self-sufficiency program ended; however, those parcels that were under review at the time were “grandfathered”, thus permitting DOE to still consider transfer of land to the city should it become excess to the needs of DOE. (DOE 2001, LMER 1999)

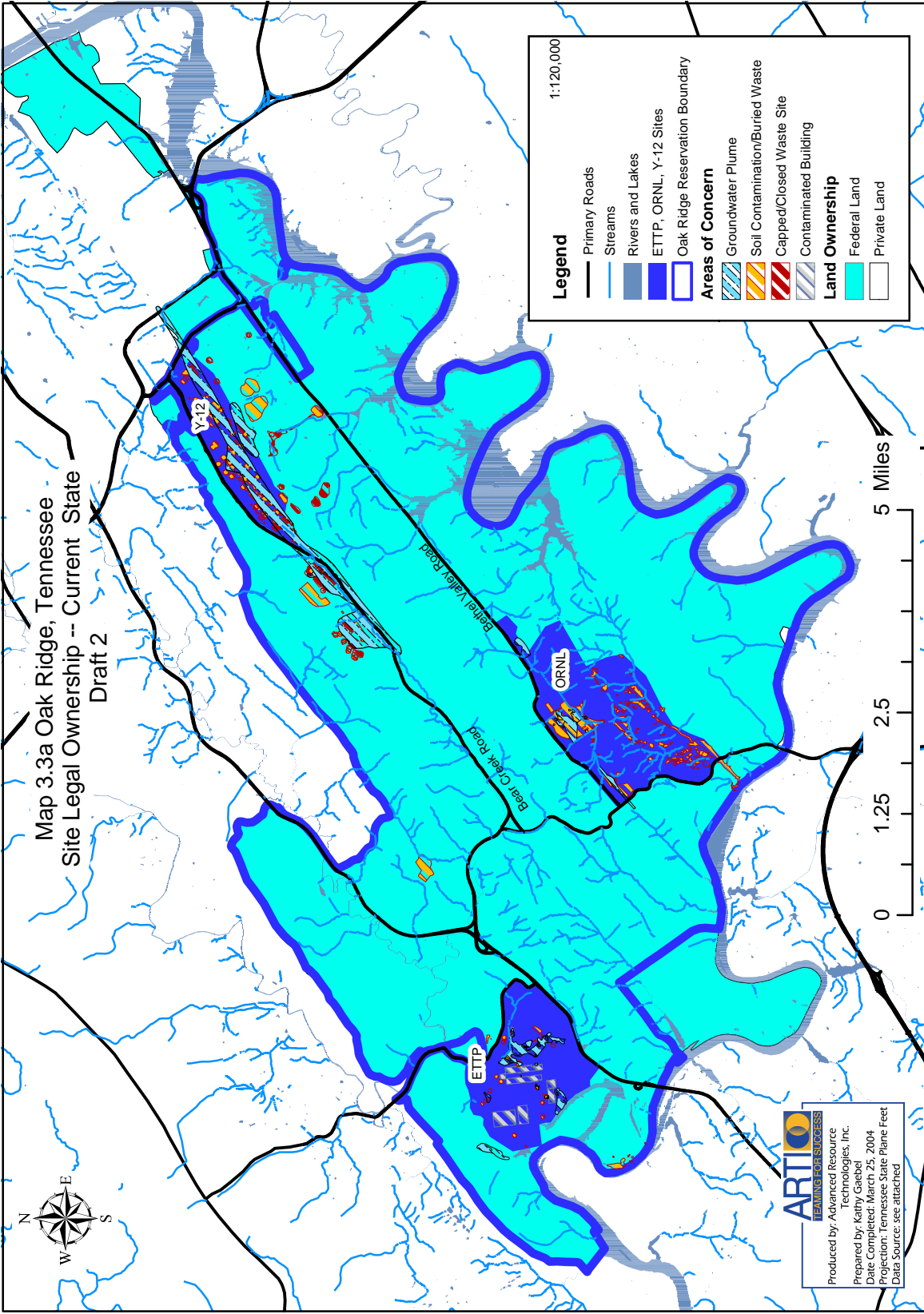
Federal ownership is expected to continue for the foreseeable future. Some portions of the ORR have been transferred to the Community Reuse Organization of East Tennessee (CROET) for commercial development, and additional commercial development, or re-industrialization, is expected to continue. In particular, the future use of ETPP is planned to be unrestricted industrial use as a commercial industrial park. The ORR constitutes approximately 60 percent of the land area within the city limits of Oak Ridge.

As discussed in the preceding section, several large tracts of land within the ORR have been established as conservation and wildlife management areas under conservation easements or cooperative agreements between DOE and TWRA.

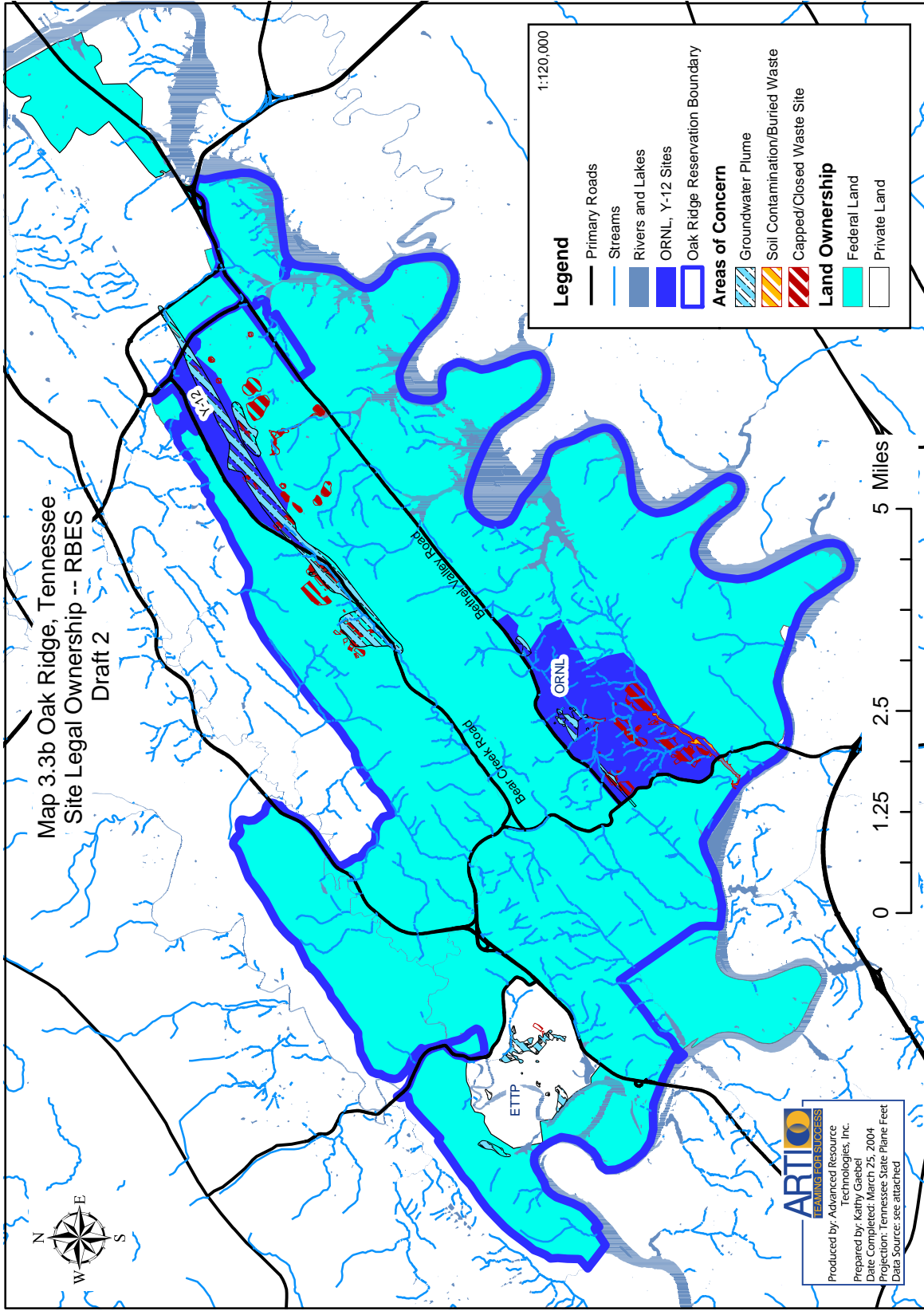
Land immediately surrounding the ORR is owned by the city of Oak Ridge, private citizens, the Tennessee Valley Authority, and private industry. Major changes in ownership of these lands are not anticipated.

Figures 3.3a and 3.3b depict the legal ownership of the ORR under the current state and RBES conditions, respectively. No differences between current and RBES conditions outside the ORR have been identified. Within the ORR, ownership of ETPP is assumed to be transferred to private industry for development as a commercial industrial park.

Map 3.3a Oak Ridge, Tennessee
Site Legal Ownership -- Current State
Draft 2



Map 3.3b Oak Ridge, Tennessee
Site Legal Ownership -- RBES
Draft 2



3.4 Site Context Demographics

According to the 2000 census, the population of the city of Oak Ridge is 27,387, and the population of Knoxville is 173,890 (USCB 2004). These values represent increases over the 1990 census totals of 27,310 for Oak Ridge and 165,121 for Knoxville. The 2000 population in the five-county region of influence (ROI) is approximately 564,000, with more than two-thirds of this total population in Knox County (Knox County, 382,032; Anderson County, 71,330; Roane County, 51,910; Loudon County, 39,086; Morgan County, 19,757).

The ORR has a significant socioeconomic impact on the area. ORR employment represents approximately 5 percent of the total workforce in the five-county area. As of 1997, DOE employees and contractors numbered more than 13,700 individuals, and these jobs had a higher average salary than the statewide average, \$40,000 compared to \$25,695 (BEA 1999). DOE employment and spending generate additional benefits to the ROI and state economies through the creation of additional jobs in sectors providing support to DOE and its workers.

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Employment in the ROI has historically been dependent on manufacturing and government employment. More recent trends show growth in the service and wholesale and retail trade sectors and a decline in manufacturing and government employment.

There were a total of 206,234 housing units in the ROI in 1990. Approximately 67 percent of these units were single family homes, 24 percent were multifamily homes, and 8 percent were mobile homes. Approximately 7 percent of the housing units were vacant, although some vacant units were used for seasonal, recreational, or other occasional purposes. Owner-occupied housing units accounted for 62 percent of the total housing units while renter-occupied units accounted for approximately 31 percent (USCB 1992).

Eight public school districts with a total of 144 schools provide educational services for the approximately 78,000 students in the ROI. Higher education opportunities in the ROI include the University of Tennessee, as well as several private colleges and community colleges.

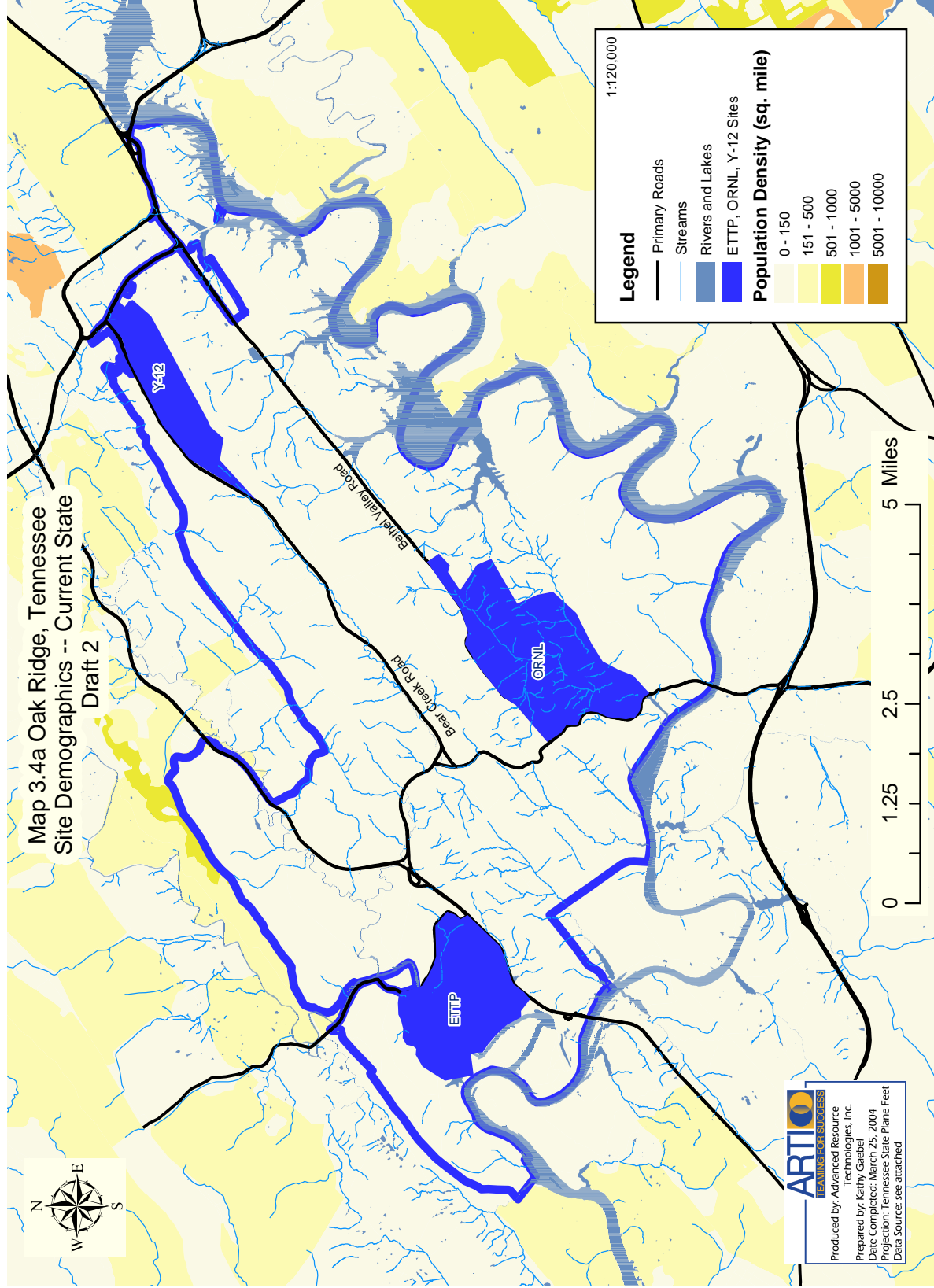
Law enforcement is provided by 20 municipal, county, and local police departments that employ over 1500 officers and civilians. Protective forces and security services for the ORR is provided by Wackenhut Services, Inc. under a contract awarded in 2000.

There are 15 hospitals with a total of over 3000 beds, and more than 1500 physicians in the ROI.

Figures 3.4a and 3.4b depict the demographic information for the ORR under the current state and RBES conditions, respectively. No differences between the current and RBES conditions outside the ORR have been identified.



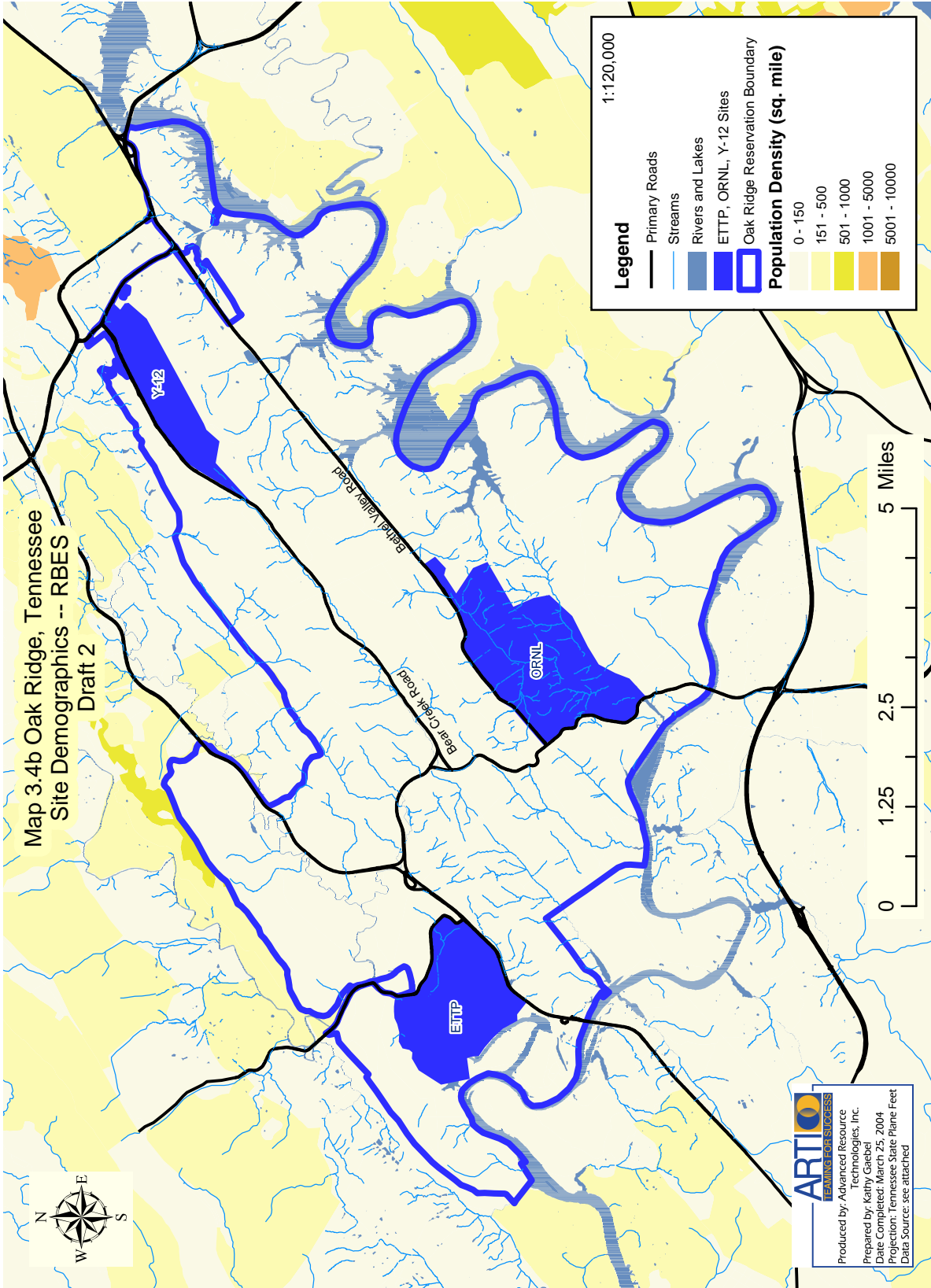
Map 3.4a Oak Ridge, Tennessee
Site Demographics -- Current State
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Map 3.4b Oak Ridge, Tennessee
Site Demographics -- RBES
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